The Bays Mountain Astronomy Club Newsletter

May 2024

Kingsport, TN

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Cosmic Reflections

Greg Penner - BMAC Interim Chair

reetings BMACer's!

I hope everyone is having a nice spring as days are getting longer, leaves are back on the trees, and we are really looking forward to some great club meetings and activities. At our May 3rd meeting, we will be having our annual student presentations event in which students from area high schools and universities will present projects in the planetarium theater. This year we have some great presentations on the agenda covering a diverse range of scientific research (not just astronomy) from star clusters to microgreens. Each presentation will be about 10 minutes and then we'll have about 2 minutes for Q&A. During our snack time after the meeting, you will be able to ask further questions. So come to the meeting prepared to engage with these students which will encourage their further studies. The students presenting are:

- North Greene County High School:
  - Noah Deyton & Mary Weems: Generational Trauma in Relation to Mental Health in Southern Appalachia

    - Michael Fox: Future, Freedom and Farming: Comparing Red, White, and Blue Lighting on Brassica Oleracea, Lactuca Sativa and Raphanus Sativus Microgreens
- Tennessee Tech University:
    - Mackenzie Henley: Analyzing Photos from the Solar Eclipse 2024
- King University:
    - Gavin Diamond and Summer Rodgers: The Age and Distance of the Open Cluster NGC 2506
    - Åsmund Norum: The 21-cm Hydrogen Line (Presented by Tom Rutherford)
    - Christian Jones (two posters):
        - The Three-Dimensional Structure of the Open Cluster IC 2391
        - Orbital Satellite Tracking: Identifying the Chinese Space Station (CSS) Tiāngōng

On May 11th, Natural Tunnel State Park will be hosting a star party and our club has been invited to attend. You are welcome to bring your own equipment. Viewing will take place at the gazebo starting at sunset.

On May 18th we will have Astronomy Day at the park! Once again we will be set up at the Pavilion from 1pm - 4pm with displays and activities. This year, Astronomy Day will coincide with "Kids at Bays Day," in which there will be multiple activities

scattered throughout the park geared toward various children's age levels. So please be thinking about kid-friendly displays or activities that you can offer for their enjoyment and education. We'll also have an HDTV set up to show photos/art from BMAC members. See the note just following this article. Later that night, we will be at the observatory from 8:30 - 9:30-ish for viewing through telescopes. We will discuss details of this more at our May meeting.

At our June 7th meeting, we will be sharing our solar eclipse stories! This meeting will be like one big "show & tell" in which all members are encouraged to share stories about their experiences viewing the solar eclipse that captivated the nation on April 8th. Whether you saw just a partial eclipse, partial view through clouds, or if you witnessed totality in a clear sky, whatever kind of experience you had would be great to share with the club. We can discuss the details of how we want the June meeting to go at our May meeting after the student presentations.

Our May meeting will be packed with a lot of great activity, so please do your best to arrive a few minutes early and we will get started on time. Looking forward to seeing everyone!

Clear skies!

A Note from Adam:

During Astronomy Day, we are setting up a large HDTV to display YOUR astro photos! We would like images from as many of our club members as possible. Don't worry if you think your image isn't "up to snuff." Guess what, it's probably much better than the general public could make and can be inspirational to others to get out and look up!

Image suggestions:

- Images can be photographs or art in any medium. Images can be a picture of a sculpture, etc. It can be simple or complex. It can be a sunset, a deep sky object, your impression of a black hole, you by your telescope, ...
- The TV will be 1080x1920 pixels set up in horizontal format. If your image is vertical in format, that is OK. Just understand that it will not look as large.

- You can send more than one! A few would be great. Ten may be too much from one person, though. :)
- E-mail me your images. Please include a title/short description of what each image is.
- Ex.: Your Name - Whirlpool Galaxy; Your Name - Sunset at Myrtle Beach
- The image can be any format, like jpg, tiff, etc. and hopefully at least 1080 tall or 1920 wide. If it is smaller, that's OK too.
- I must have all images by May 14 or before. Before is much better. I have a template and will add your name and description to the image and set up the slide show. It will loop during the whole event at the Pavilion.

BMAC Notes

Astronomy Night at Mount Carmel Elementary

Michael Hopkins

nother rainy night, but plan B was a great hit with the students at Mount Carmel Elementary on March 26th STEAM (Science, Technology, Engineering, Arts and Mathematics) evening event. The gym was great allowing the 185 parents and students a view through the telescope to see a small informative graphic taped to the opposite wall of the gym. For many, this was the first time to look through an eyepiece which, when successful, is a great win. Parents were just as excited as the children to see and hear about the science of our Sun, what an Orrery is and which of the planets was Earth, seeing the James Webb Telescope and how it worked, the Ingenuity Helicopter and its Mars rover Perseverance, and finally the then upcoming Eclipse information which was greatly needed for many of the parents who hadn’t yet prepared.


The Radio Sun
The Infrared Sun
The Sun's Photosphere
JAMES WEBB
NIRCAM
MIRI
NIRISS
NIRSPEC
Solar Eclipses
Eclipses
Lunar Eclipses
APRIL 8, 2024
No!
No!
SIX
6


WELCOME!
IS
ALL
ABOUT
Solar Eclipses
Eclipses
SAFELY
THE SUN
APRIL 8, 2024
No!
No!


LEFT
RIGHT
THREE
3
ZERO
0
CELESTRON

BMAC Photos

Here is a nice photo of the eclipse by Greg Penner.

Solar Eclipse Experience Cleveland Ohio 4-08-2024

Michael Hopkins and Cleveland Family

Editing by: Angie Mroczka

Photos contributed by: Michael Hopkins, Lura Hopkins, Angie Mroczka

The following article would have been held until the July issue as a follow up to our June meeting that would be BMACers sharing their stories about the eclipse. Michael will be out of town during the June meeting, so we are publishing his article now. BMACers, please consider sharing your eclipse stories at the June meeting and sending me photos for the newsletter. [Ed.]

Michael writes:

I was eagerly heading to Cleveland, Ohio, regardless of the weather, to visit family, fully prepared for whatever nature had in store for us.

The morning started with clear blue skies, and then a thin layer of clouds rolled in but didn't spoil the event.

I meticulously set up my Celestron Nexstar 6SE telescope, which was finally fixed after 18 months, and connected it to my iPhone for tracking. This ensured that I was fully prepared and could focus on the event without any technical issues.

At first contact, we noted so many aircraft flying overhead, and the contrails were all over the sky.

As we confirmed the first contact, the entire household, filled with anticipation and wonder, stepped outside to witness this celestial spectacle together.

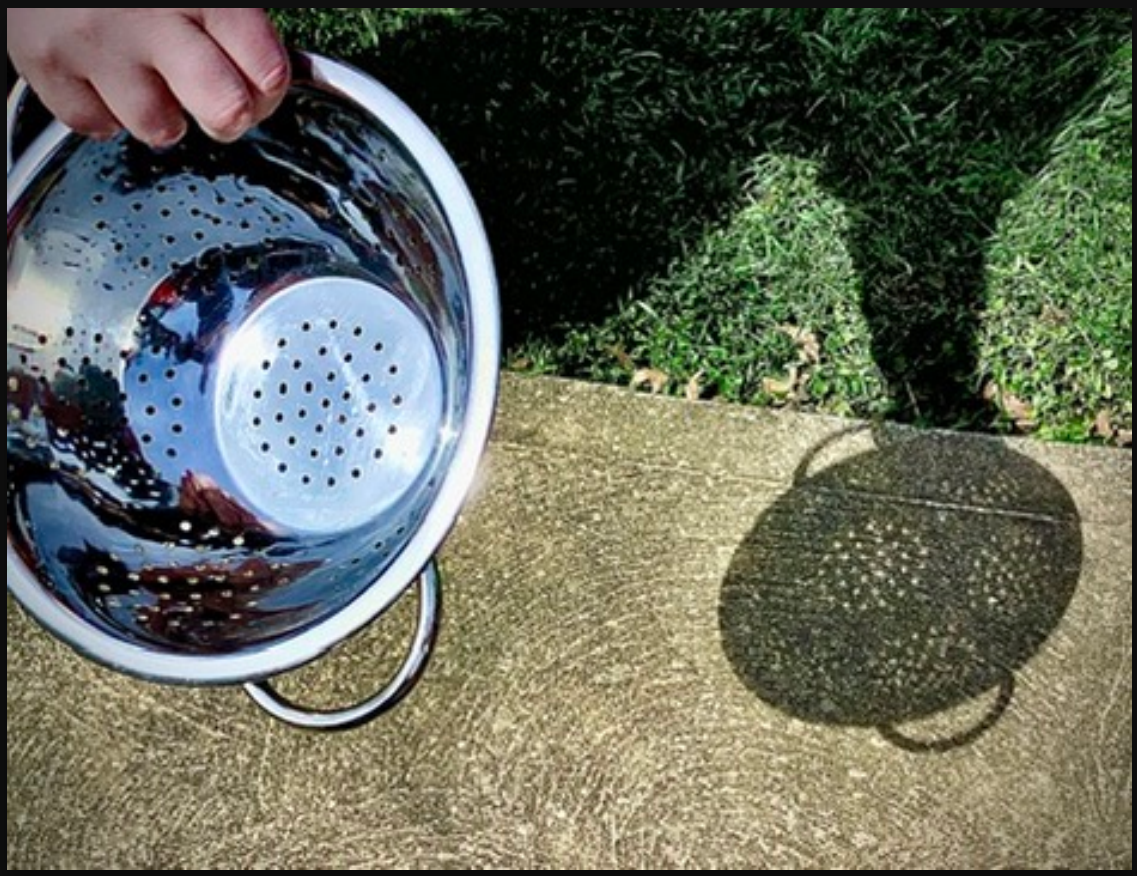
As the eclipse progressed, I couldn't help but be in awe. The words 'Wow' and 'Amazing' were on everyone's lips, including mine.

The 3D glasses I had printed for each family member in their favorite color were not just a fun accessory. They were crucial in allowing us to safely observe the eclipse without damaging our eyes.

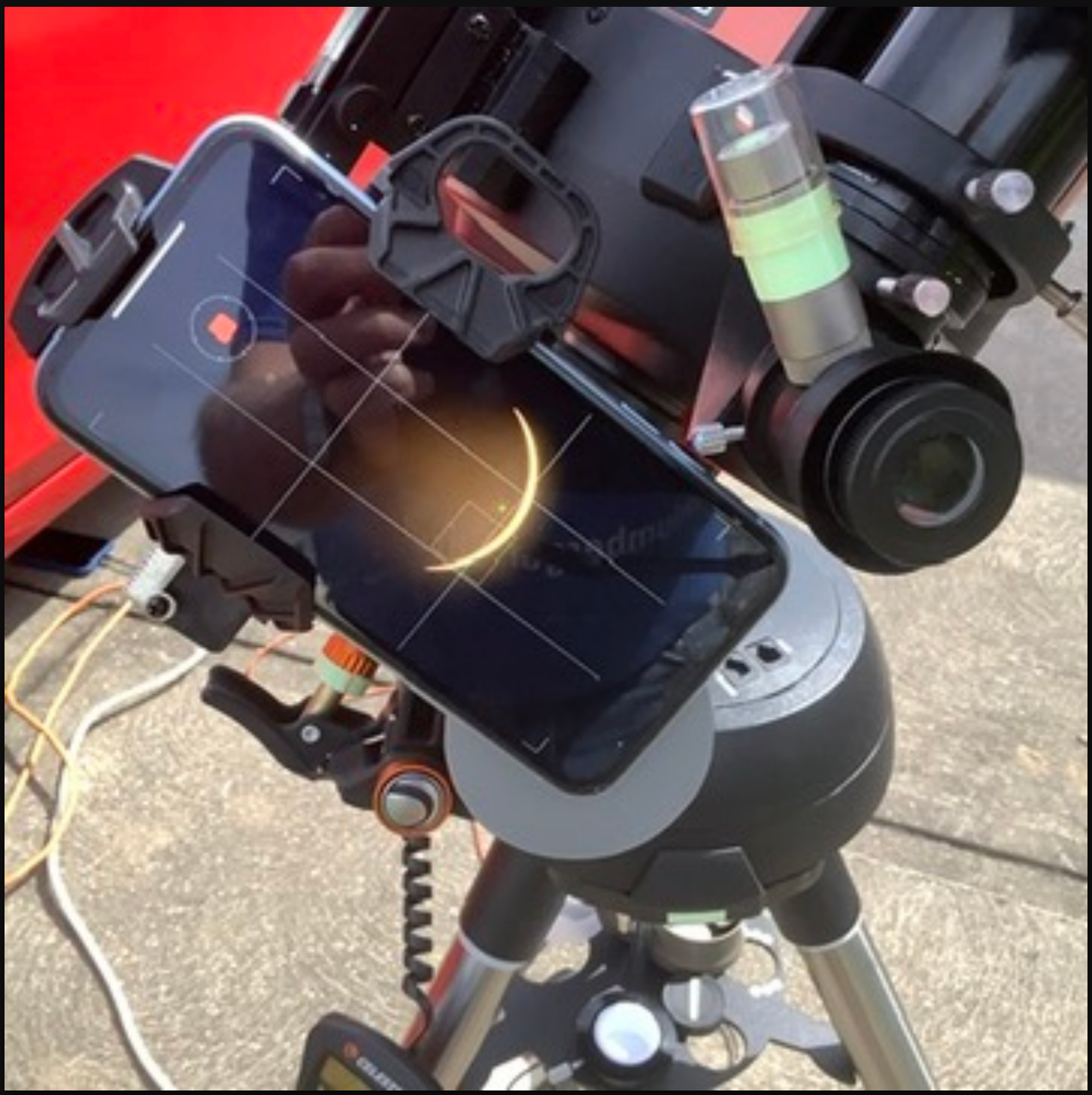
The upcoming event took time, and the family kept tabs on the eclipse with spot checks.

My grandson took a more practical approach and got his chair and a project to avoid missing anything. I discussed with them what to look for and feel with their senses when the Sun went behind the Moon. “It will get colder, the wind will slow down, animals will act unusually, the sky will go dark, a sunset will show up 360 degrees around us, and we will look around the Sun to see the night sky.”

A few went inside to get their coats, so I guess they were listening.



I messed around with a kitchen colander and found the holes needed to be smaller.

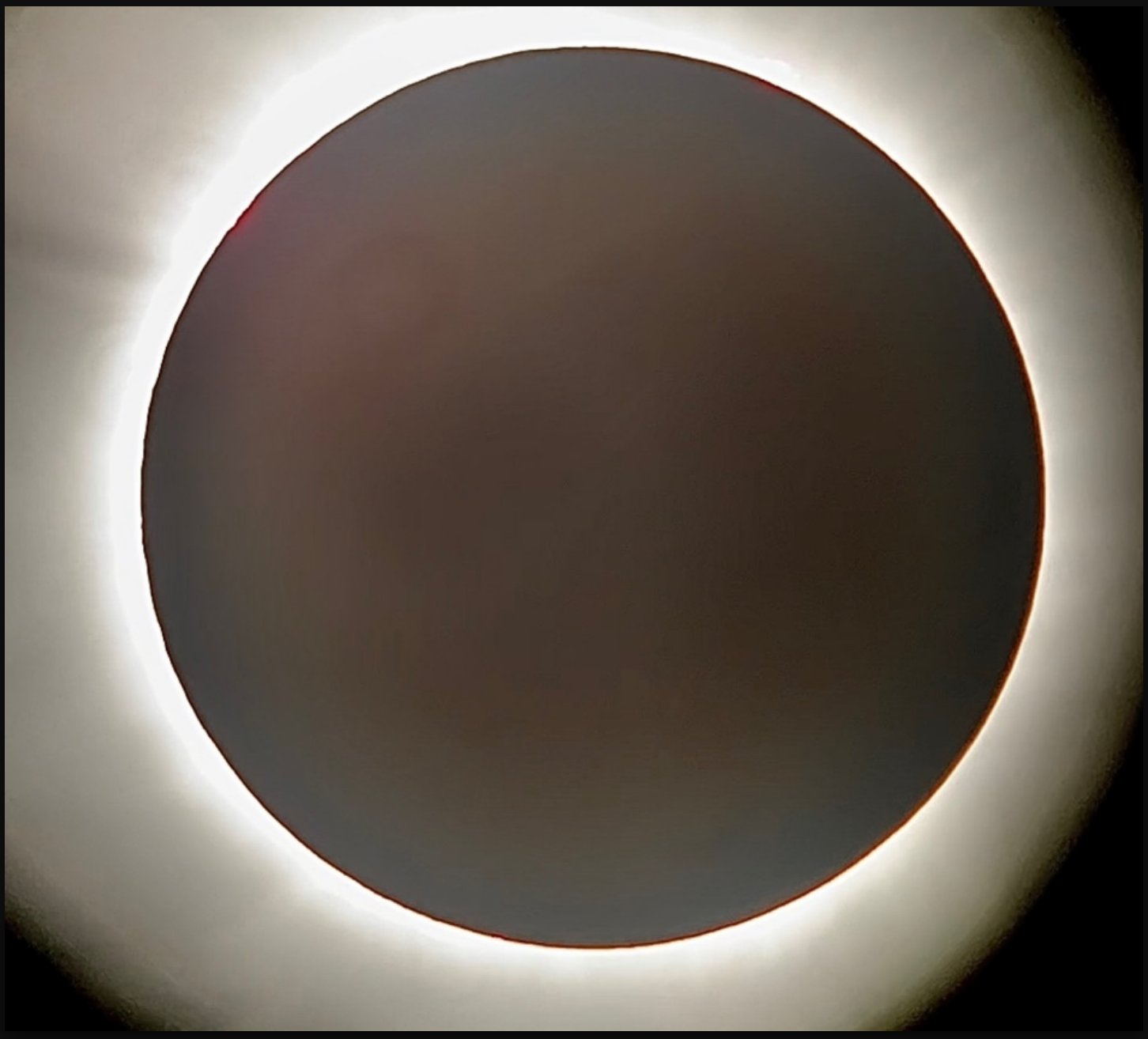


Finally, the big moment was upon us to experience a life event.

"Totality"

The opportunity to test the sharpness of the light shadow as the sky began to dim. I took a photo.

As the eclipse reached its peak, I removed the solar filter from my telescope, revealing a breathtaking sight. The corona, a halo of light surrounding the darkened sun, was a sight to behold. I couldn't help but share this moment with everyone, urging them to remove their glasses and witness this natural wonder.



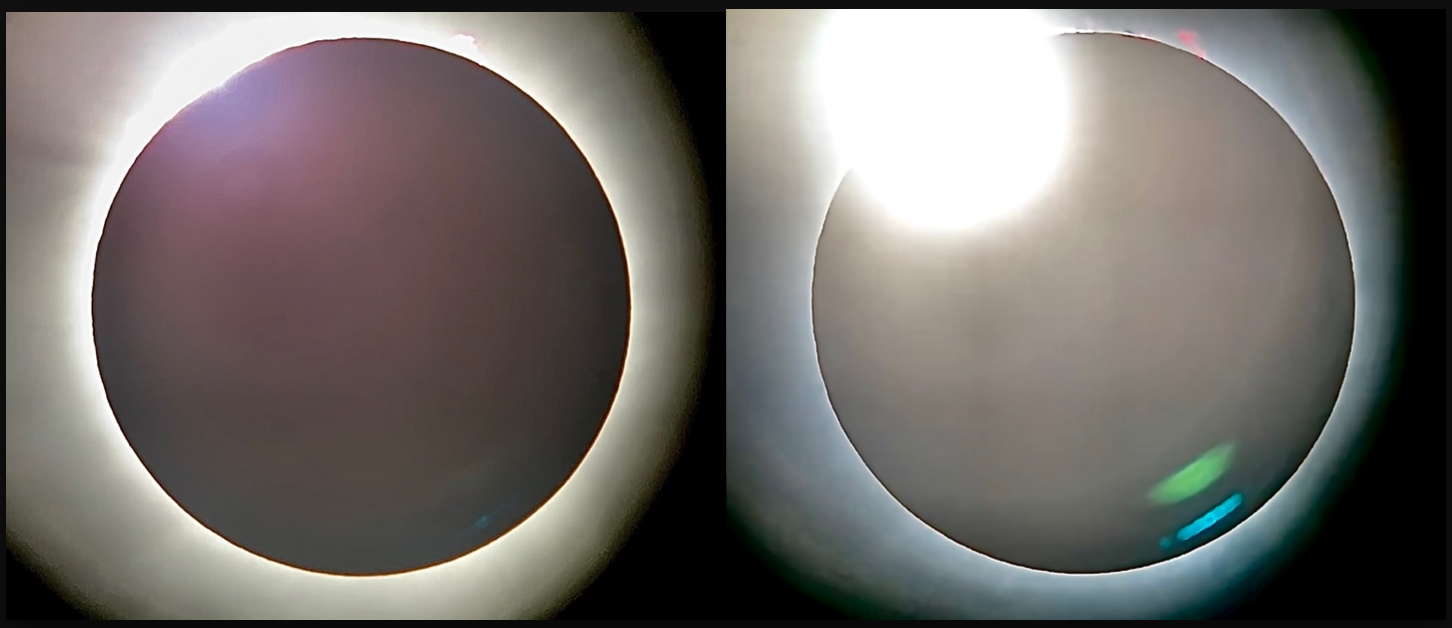
I managed to capture this stunning photo through my telescope using my iPhone. The clarity and detail it captured were truly remarkable.

I took this photo with my Canon digital camera.

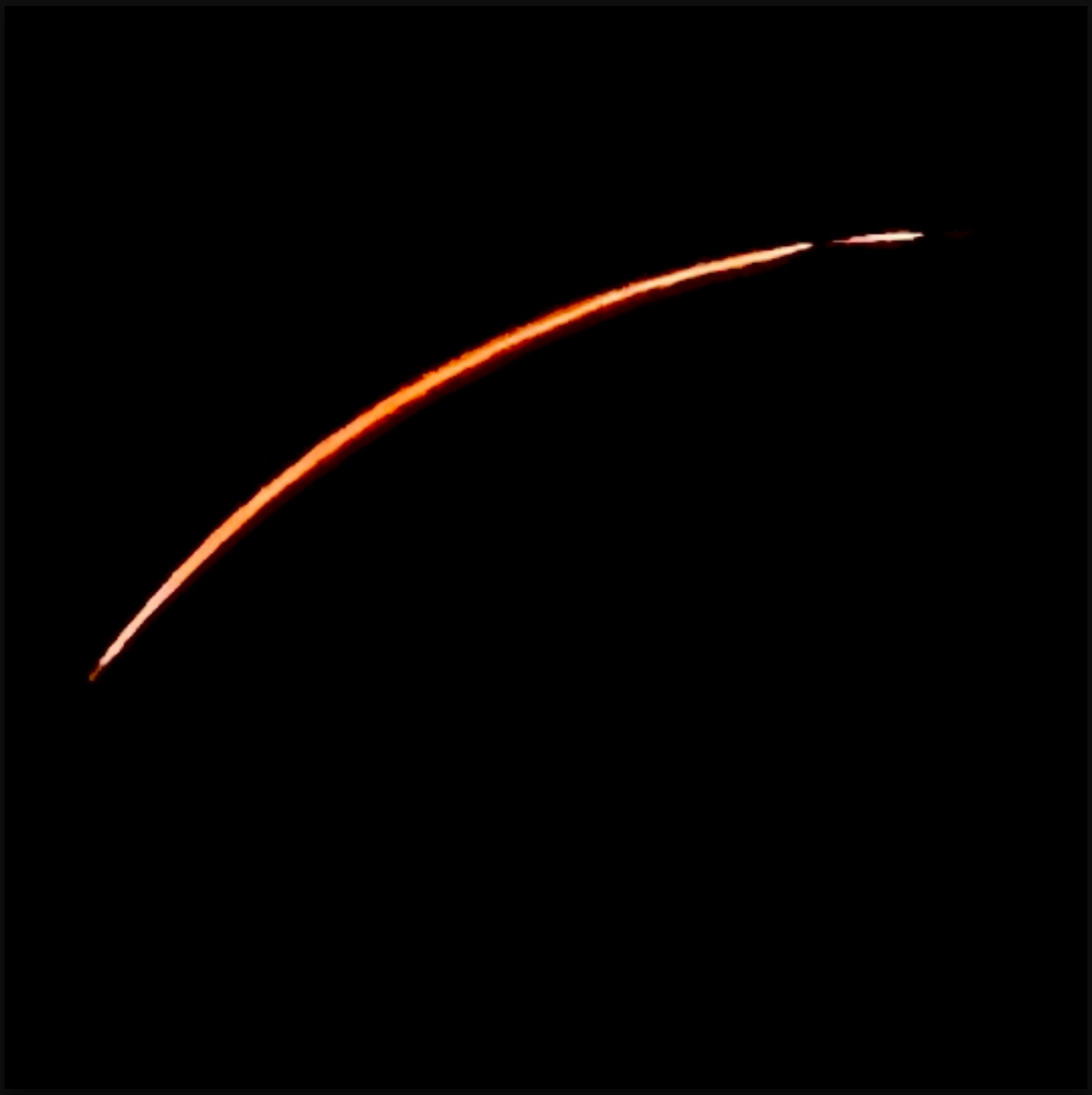
During totality, when the Moon completely blocks the Sun, the corona, or outer atmosphere, is visible. We can't witness this due to the Sun's blinding light, yet it is quite visible during the nearly four minutes of a total eclipse event. You could also see bright red areas around the perimeter of the Moon. These are called solar prominences, and they're filaments that have erupted from the Sun's surface, going hundreds to thousands of miles into space past the Moon's diameter.

The sunset surrounded us on every side. It was much cooler as well.

The now-visible night sky shows both Venus (R) and Jupiter (L).



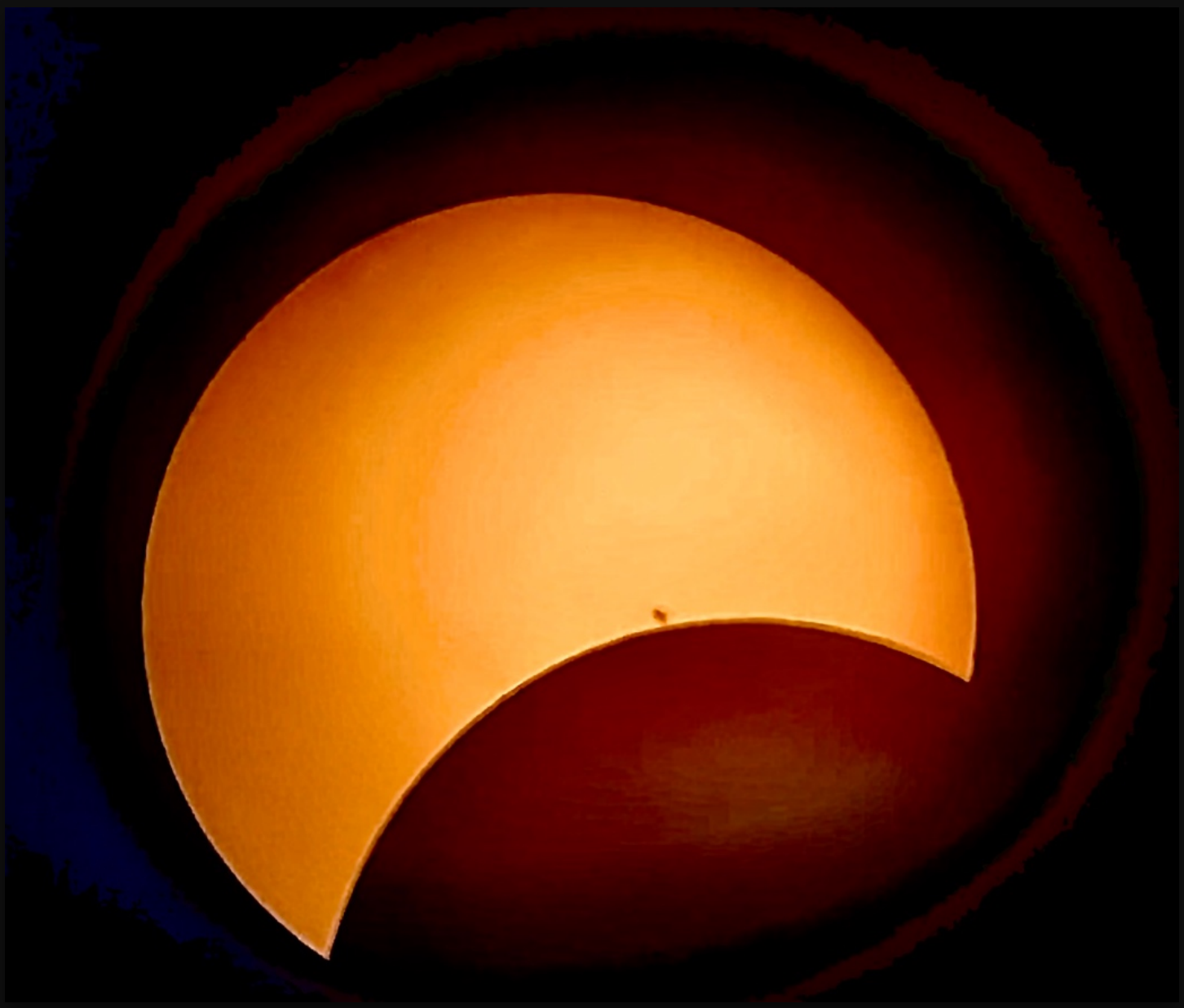
It's now urgent to put our solar glasses back on. I didn't forget the filter for the telescope, thank goodness. I yelled out, “Put on your glasses.”



As the eclipse neared its peak, a fascinating phenomenon known as Baily's Beads occurred. These are the first bits of the bright photosphere that shine through the valleys aligned at the edge of the Moon, creating a stunning visual effect.

The eclipse passed the halfway point. Family and neighbors are still checking it out, but not with the same observation frequency.

The second half of my experiment with shadows shows an actual difference. The right shadow is dull around the edges, and the Sun's light is much brighter from more Sun exposure to Earth.



Now, I'm alone outside, with the most incredible show on Earth nearing an end. I'm packing my gear but keeping the Time-Lapse video going until the end.

Time-Lapse Video of the Eclipse

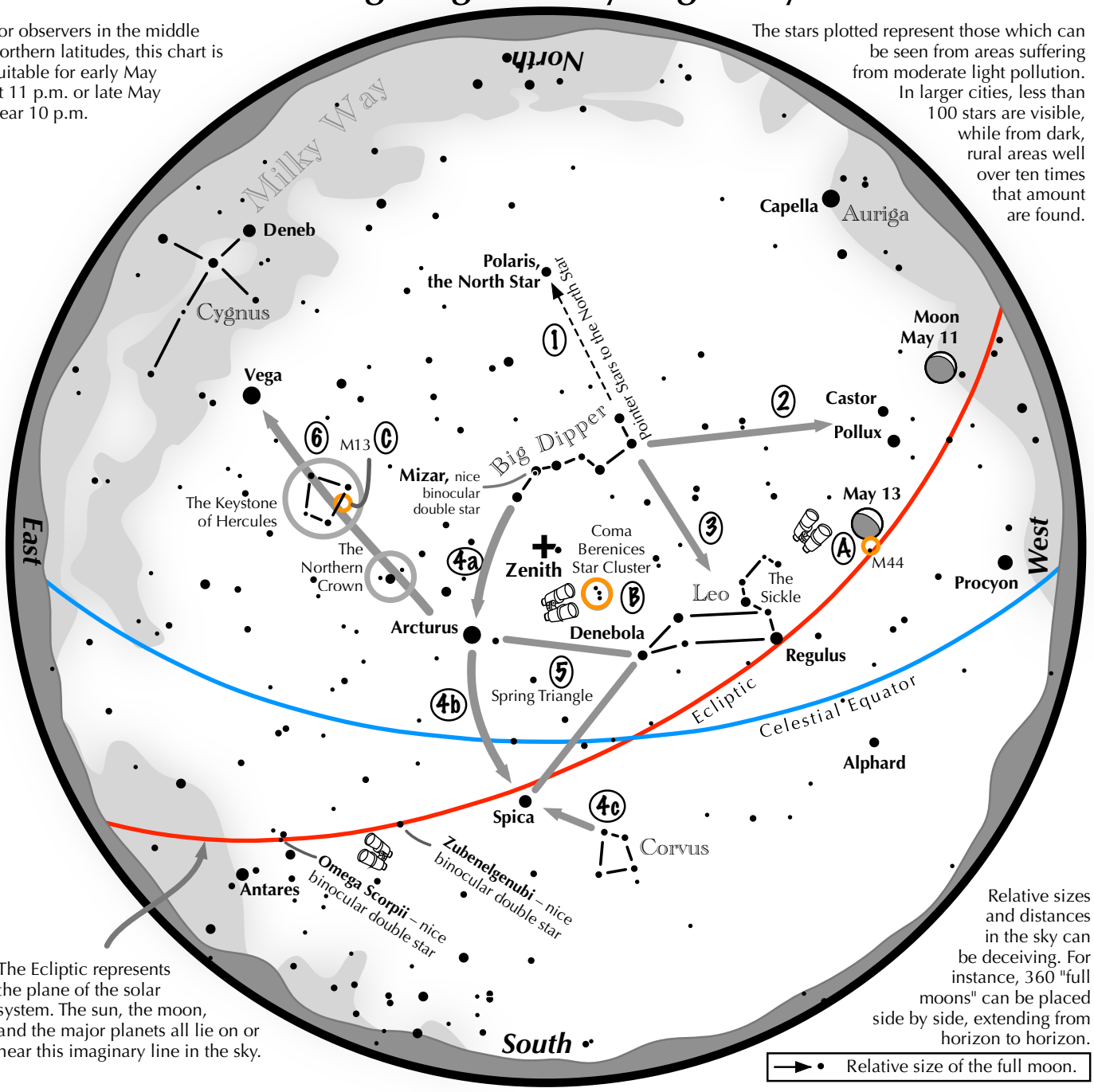
Sky News from the Astronomical League

The Astronomical League has a plethora of educational content to help you learn and enjoy the night sky more. The following inserts are just a tiny bit of what they provide.

Navigating the May Night Sky

For observers in the middle northern latitudes, this chart is suitable for early May at 11 p.m. or late May near 10 p.m.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.



The Ecliptic represents the plane of the solar system. The sun, the moon, and the major planets all lie on or near this imaginary line in the sky.

Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons" can be placed side by side, extending from horizon to horizon.

Relative size of the full moon.

Navigating the May night sky: Simply start with what you know or with what you can easily find.

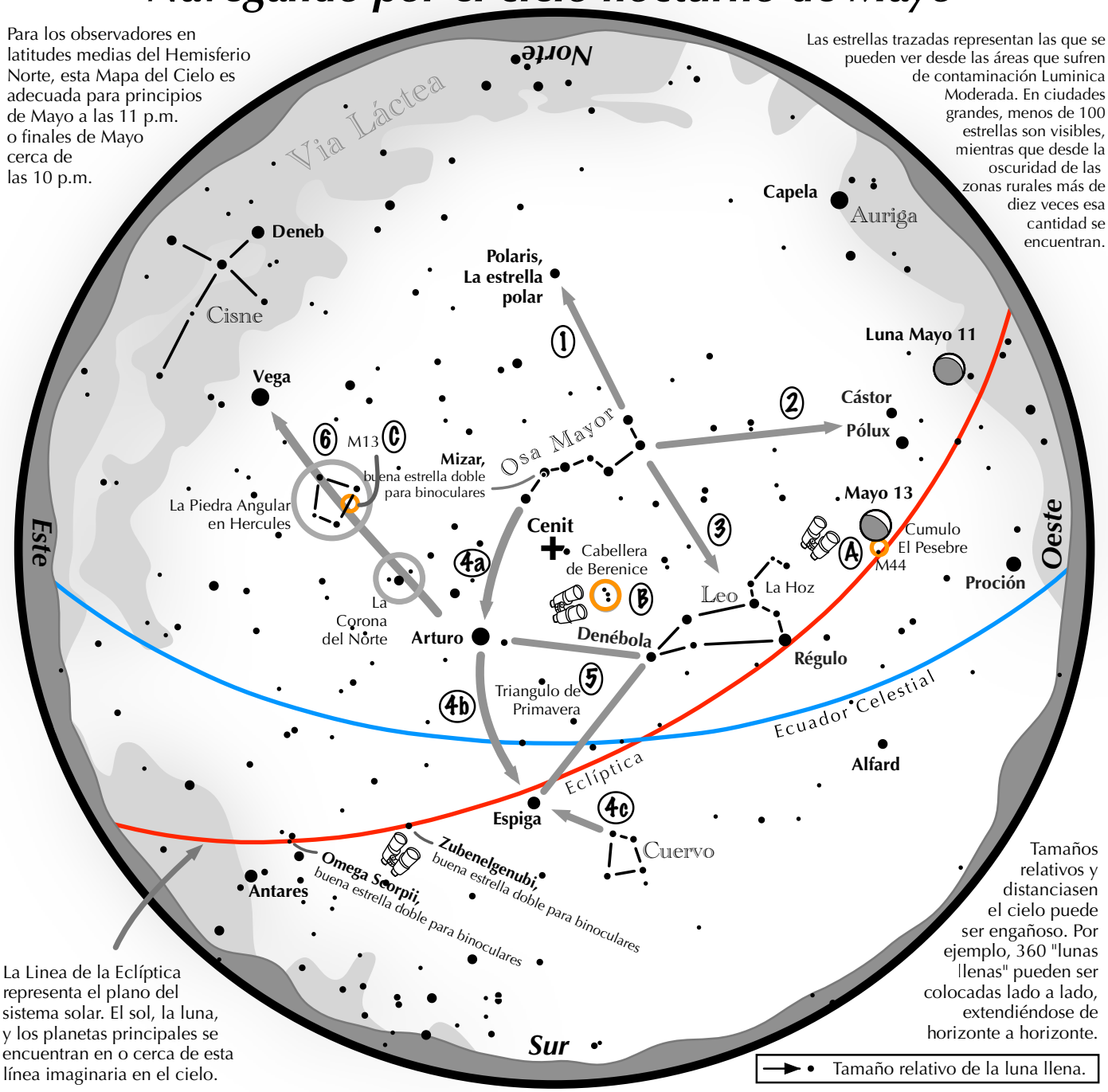
1. Extend a line northward from the two stars at the tip of the Big Dipper's bowl. It passes by Polaris, the North Star.
2. Through the two diagonal stars of the Dipper's bowl, draw a line pointing to the twin stars of Castor and Pollux in Gemini.
3. Directly below the Dipper's bowl reclines the constellation Leo with its primary star, Regulus.
4. Follow the arc of the Dipper's handle. It first intersects Arcturus, then continues to Spica.
   Confirm Spica by noting that two moderately bright stars just to its southwest form a straight line with it.
5. Arcturus, Spica, and Denebola form the Spring Triangle, a large equilateral triangle.
6. Draw a line from Arcturus to Vega. One-third of the way sits "The Northern Crown." Two-thirds of the way hides the "Keystone of Hercules." A dark sky is needed to see these two dim stellar configurations.

Binocular Highlights
A: M44, a star cluster barely visible to the naked eye, lies to the southeast of Pollux. **B:** Look near the zenith for the loose star cluster of Coma Berenices. **C:** M13, a round glow from a cluster of over 500,000 stars.

Navegando por el cielo nocturno de Mayo

Para los observadores en latitudes medias del Hemisferio Norte, esta Mapa del Cielo es adecuada para principios de Mayo a las 11 p.m. o finales de Mayo cerca de las 10 p.m.

Las estrellas trazadas representan las que se pueden ver desde las áreas que sufren de contaminación Luminica Moderada. En ciudades grandes, menos de 100 estrellas son visibles, mientras que desde la oscuridad de las zonas rurales más de diez veces esa cantidad se encuentran.



La Linea de la Eclíptica representa el plano del sistema solar. El sol, la luna, y los planetas principales se encuentran en o cerca de esta línea imaginaria en el cielo.

Tamaños relativos y distanciasen el cielo puede ser engañoso. Por ejemplo, 360 "lunas llenas" pueden ser colocadas lado a lado, extendiéndose de horizonte a horizonte.

Tamaño relativo de la luna llena.

Navegando por el cielo nocturno: simplemente comience con lo que sabe o con lo que puede encontrar fácilmente.

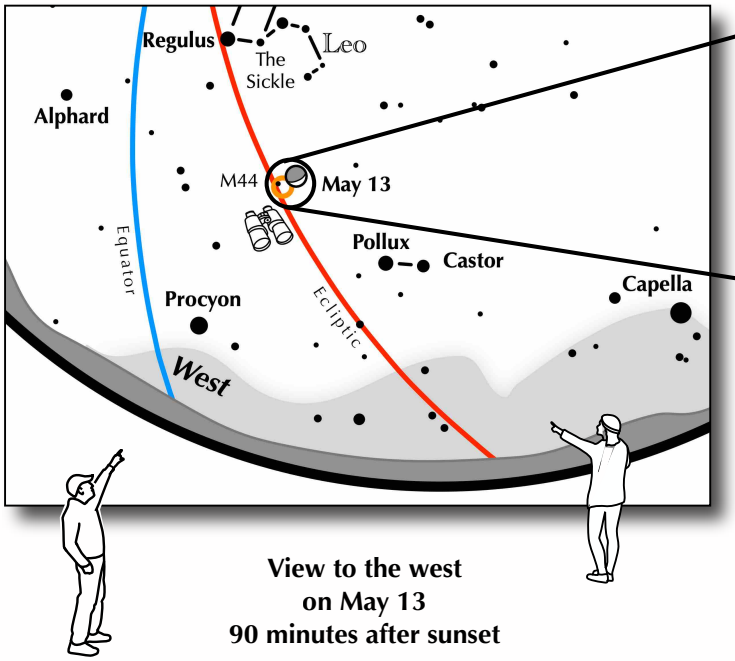
1. Haz una línea hacia el norte desde las dos estrellas en la punta de la Osa Mayor. Pasa por Polaris, la estrella polar.
2. A través de las dos estrellas diagonales de la Osa Mayor, dibuja una línea que apunta a las estrellas gemelas de Cástor y Pólux en Géminis.
3. Directamente debajo del tazón de la Osa Mayor se encuentra Leo con su estrella principal, Régulo.
4. Siga el arco del mango del tazón de la Osa Mayor. Primero cruza Arturo, luego continúa hacia Espiga, luego Cuervo.
5. Arturo, Espiga y Denébola forman el triángulo de primavera, un gran triángulo equilátero.
6. Dibuja una línea desde Arturo a Vega. Un tercio del camino se encuentra "La Corona del Norte". Dos tercios de esa distancia llevan a la "piedra angular de Hércules." Se necesita un cielo oscuro para ver estas dos configuraciones estelares tenues.

Puntos destacados con binoculares

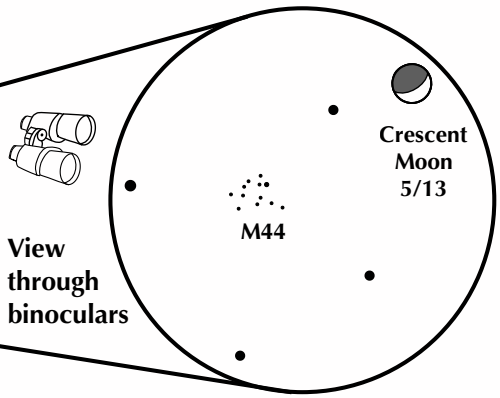
A: M44 (Cumulo El Pesebre), un cúmulo de estrellas apenas perceptible a simple vista, se encuentra al sureste de Pólux. **B:** Mira alto en el este para ver el cúmulo de estrellas perdidas de Cabellera de Berenice. **C:** M13, un brillo redondo de un cumulo de más de 500,000 estrellas.

Traducción al español por Dr. Salvador Aguirre

In the early evening on May 13, try this challenge:



View to the west
on May 13
90 minutes after sunset



View
through
binoculars

Crescent moon meets the Beehive

On the evening of May 13, the crescent moon floats right of M44, the Beehive star cluster. Look in the west 90 minutes after sunset.

Be sure to use binoculars to spot the many stellar bees of M44. The cluster has over 1000 stars, but only two dozen will be picked out with binoculars.

Even though they lie near each other in binoculars, they are nowhere near each other in three-dimensional space. M44 is 150 million times farther than the moon!

It has taken the light from M44's stars over 600 years to reach your eyes!

Binoculars and Double Stars

A rewarding and challenging activity

https://www.astroleague.org/binocular-double-star-observing-program/

Effective Binocular Observing ...

- Binoculars must be precisely focused.
- Binoculars must be held steady. Mounted on a tripod is best.
- Adequate dark adaption is needed. Wait at least 15 minutes in the dark before meaningful observing begins. 30 minutes is better.
- Glare from a bright primary interferes with spotting a dim secondary. The greater the magnitude difference, the greater the difficulty splitting them.
- Steady atmospheric seeing is desired.
- Best observed when the double star has an altitude higher than 30º.

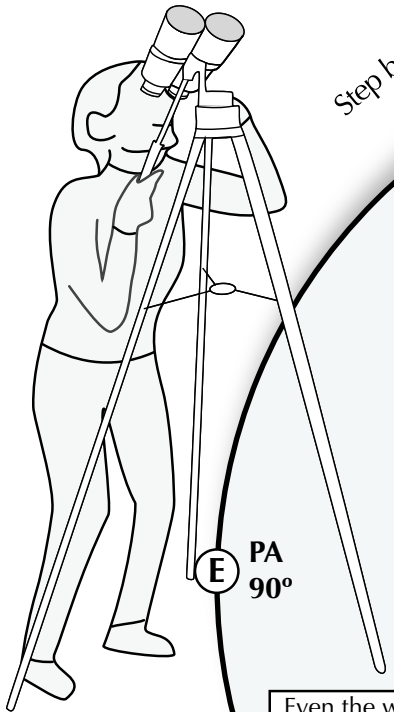
In Your Observing Notes:

- Brightnesses of the components.
- Separation of the components.
- Position Angle (PA).
- Colors of the components.
- Neighboring stars in the field?
- Seeing conditions.
- Atmospheric transparency.
- Altitude.

Rule of Thumb ...

Minimum <u>true</u> separation with 10 x 50 binoculars:

- 24 arc seconds for two stars of 4th magnitude. This equals 4 minutes apparent separation.
- For comparison, the full moon has a true diameter of 1800 arc seconds (=30 minutes).
- **True separation** is the angular space between stars as it appears to the unaided eye. **Apparent separation** is how it appears in binoculars.



Step back 1.5 m (4.75 ft) from this 150 mm (6 inch) printed field, and the 6º field will match 6º in the sky.

PA N 0º

6º true angular field – typical for binoculars

PA E 90º

PA 270º W

PA S 180º

Example Doubles

Alpha Capricorni
381", PA: 290º

Delta Cephei
41", PA: 191º

Σ1474 Hydrae
66", PA: 27º

56 Andromedae
203", PA: 298º

Nu Draconis
61", 311º

Alpha Ursae Majoris
385", 206º

Stellar Magnitude

2 ●
3 ●
4 ●
5 •
6 •
7 ·
8 ·

Relative diameter of the full moon.

Separation distance

— 600" = 10'
– 300" = 5'
- 120" = 2'
· 60" = 1'
· 40" = 0.67'

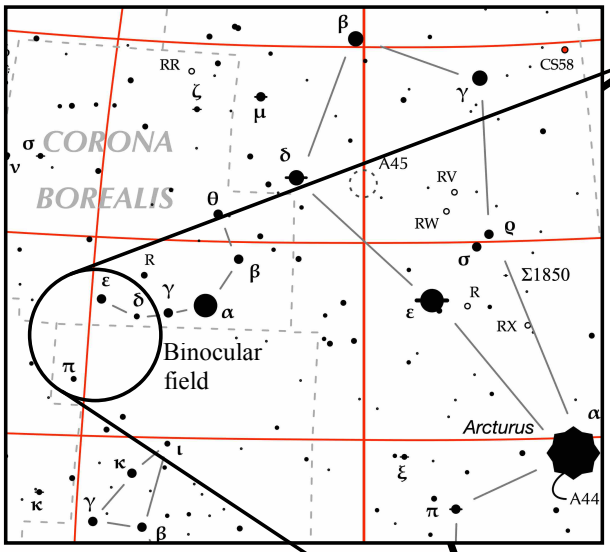
Even the wider doubles appear close to each other. Two stars that have a tight separation, or a large magnitude difference, or a combination of the two are much more difficult to split, sometimes frustratingly so, but an enjoyble challenge nonetheless.

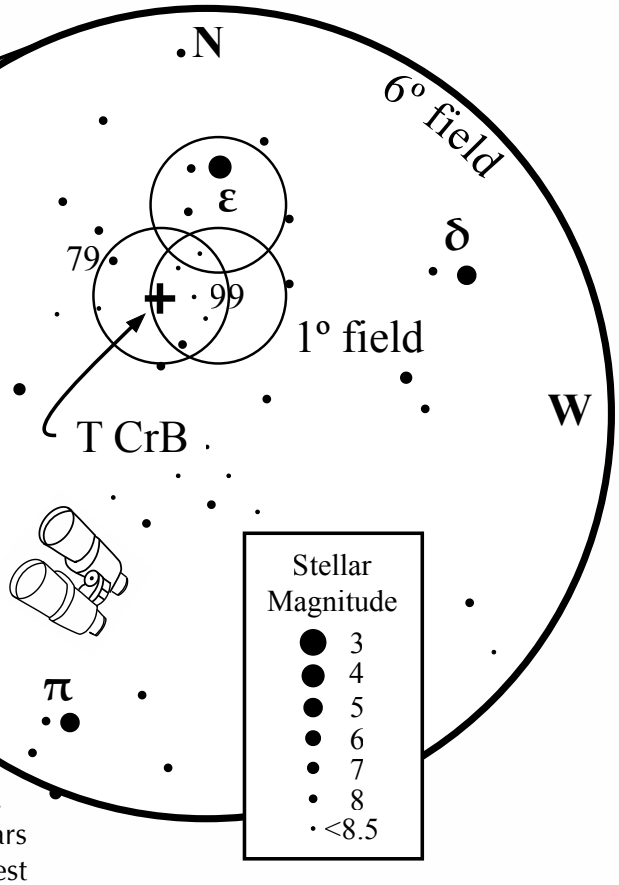
2402

T Coronae Borealis

A nova waiting to happen – soon!

also known as HIP 78322 and the "Blaze Star"





How to find
T Coronae Borealis

A. Locate bright Arcturus and the kite shaped constellation Boötes.
B. Corona Borealis lies directly east of Boötes.
C. Trace the semi-circle of the stars of the crown.
D. Epsilon and Delta are fourth magnitude stars shining east of Alpha (Gemma), the brightest member of the crown.
E. Place Epsilon in the northern half of the binocular (or finder) field. Fifth magnitude Pi Serpentis lies near the bottom of the field.
F. T Coronae Borealis is about 1/4 the distance between Epsilon and Pi.
G. Move two low power eyepiece fields south of Epsilon.
H. Then move 1/2 low power eyepiece field east.
I. This is the vicinity of 10th magnitude T CBr.

- The star normally is magnitude 10.3.
- Ten years before its outburst, it rises to magnitude 9.8. It did this 10 years ago.
- It then dims to about magnitude 12 one year before outburst. It did this in April 2023.

Between now and September, T CrB is predicted to nova, quickly reaching 2nd magnitude and rivaling the brightness of Alpha CrB (Gemma).

- Its brightness rise will take one day or less.
- It will likely remain near maximum brightness (2nd mag.) for only a few days.

T CrB: Blaze Star

2403

Stellar Observations

Greg Penner

The Sky Abounds!

Now that all of the solar eclipse related planning, traveling, and all-around exciting activity that captured the attention of the entire nation has subsided, it is a good time to reset our attention to all of the usual astronomical targets we enjoy. What is happening up in the sky in the month of May? Let's take a look at the usual cast of characters plus one special guest we continue to follow.

Sun and Moon

Wait a minute, didn't we just see that show!? This is just a reminder that the two most dominant objects in the sky are pretty interesting to look at, each on their own merits. After all, the Sun is at the peak of its cycle, exhibiting some nice sunspots on almost any day. If you acquired solar filters for the eclipse event, you can still keep an eye on the Sun to monitor sunspot activity. You can follow groups of sunspots as they travel across the face of the Sun, perhaps taking pictures or making sketches to document the activity. As we get closer to Summer Solstice,

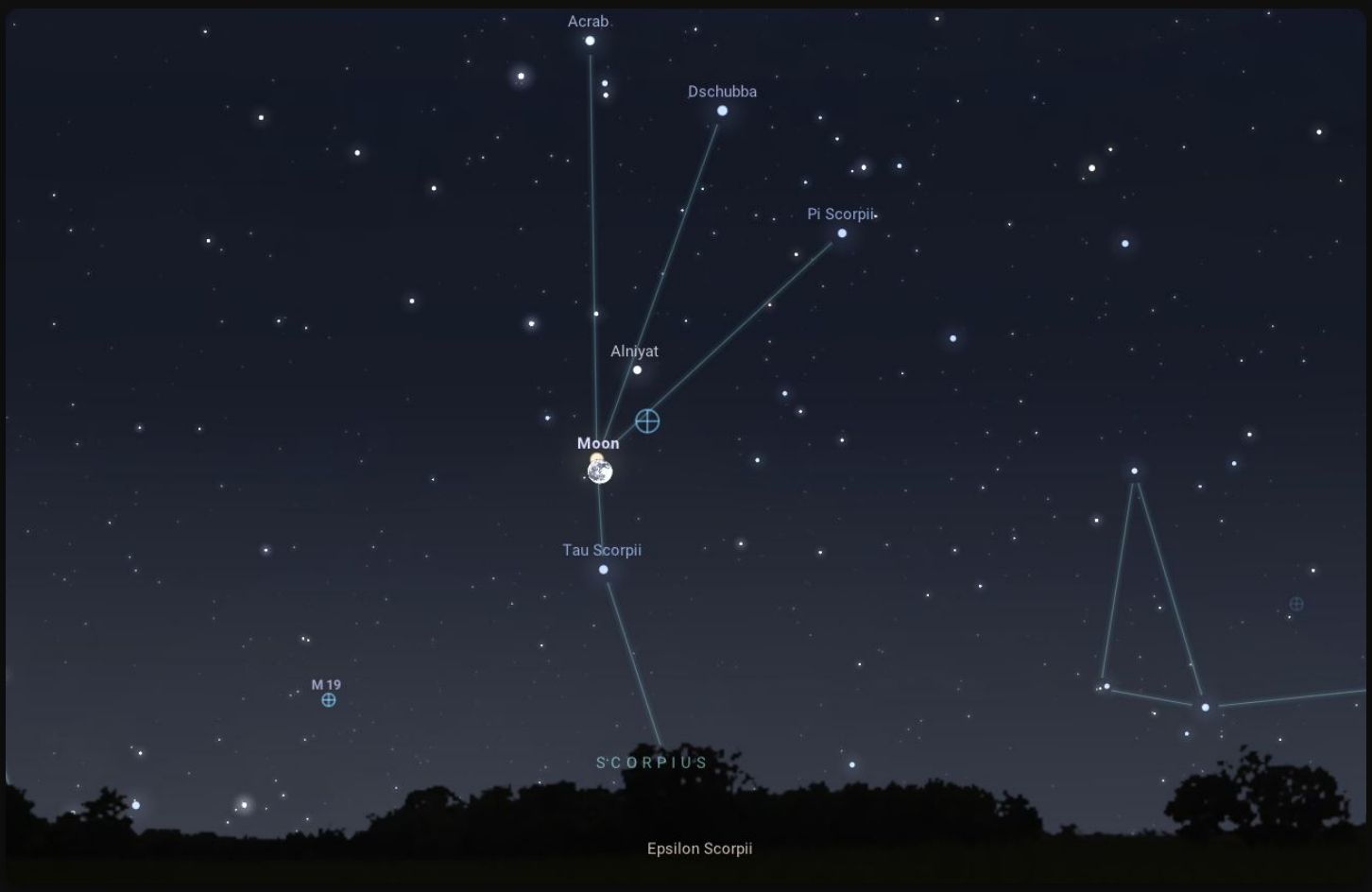
and it seems like the Sun won't ever go down to let you look at the stars, why not have a look at our nearest star?

Large sunspots on partially eclipsed Sun from Oct. 23, 2014 partial solar eclipse. Image by Greg Penner.

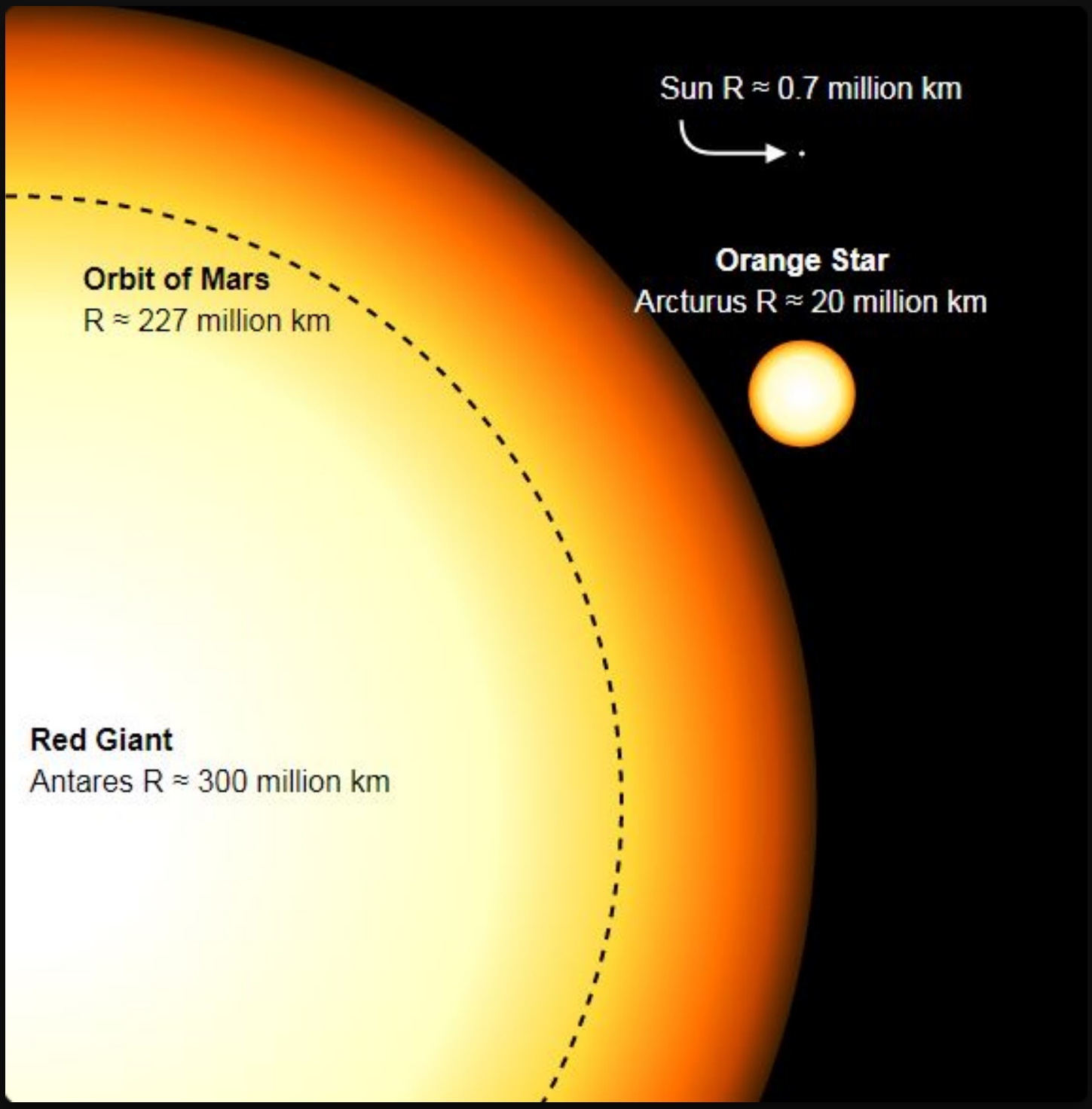
The Moon is always fun to look at, as I was reminded at a recent StarWatch event. The Moon was nearing first quarter, and we had people lining up to ooh and ah over the craters and mountains of the Moon with their stark shadows along the terminator. A few people got some really nice pictures of the Moon through my telescope eyepiece fitted with an adaptor for attaching phones. The Moon is actually going to pass in front of another "Sun" later in the month of May. On the evening of May 23rd, just as it is rising on the eastern horizon around 9:30p, the Moon will slide in front of the bright, 1st magnitude red supergiant star Antares. During the solar eclipse, the interesting fact was often repeated regarding the Sun being 400 times larger than the Moon, but also 400 times further away, thus the ideal size for the eclipse. In the case of Antares, if this "Sun" was placed at the center of our Solar System, it would extend out to somewhere between the orbits of Mars and Jupiter, making it one of the largest stars visible to the naked eye. But of course, with Antares being 550 light years away, the Moon has no trouble covering (occulting) the star for over 40 minutes.

Antares is actually a double star, with Antares B being a 5.5 magnitude companion only about 2.6 - 2.8 arcseconds away. The companion can be very difficult to see due to the brightness of the primary, but when Antares re-emerges from behind the Moon around 10:13p, you might be able to see the dim companion first (through a telescope), followed a few seconds later by the brighter primary. Seeing the companion would be easier if the Moon was not full, and the star re-appeared from behind the dark limb. For that reason, plus being only 8 degrees above the horizon, this observation may be too difficult.

LINK to video showing Antares reappearing from behind the Moon and you can see the B component.



Moon occultation of Antares on 5-23-24. Image from Stellarium

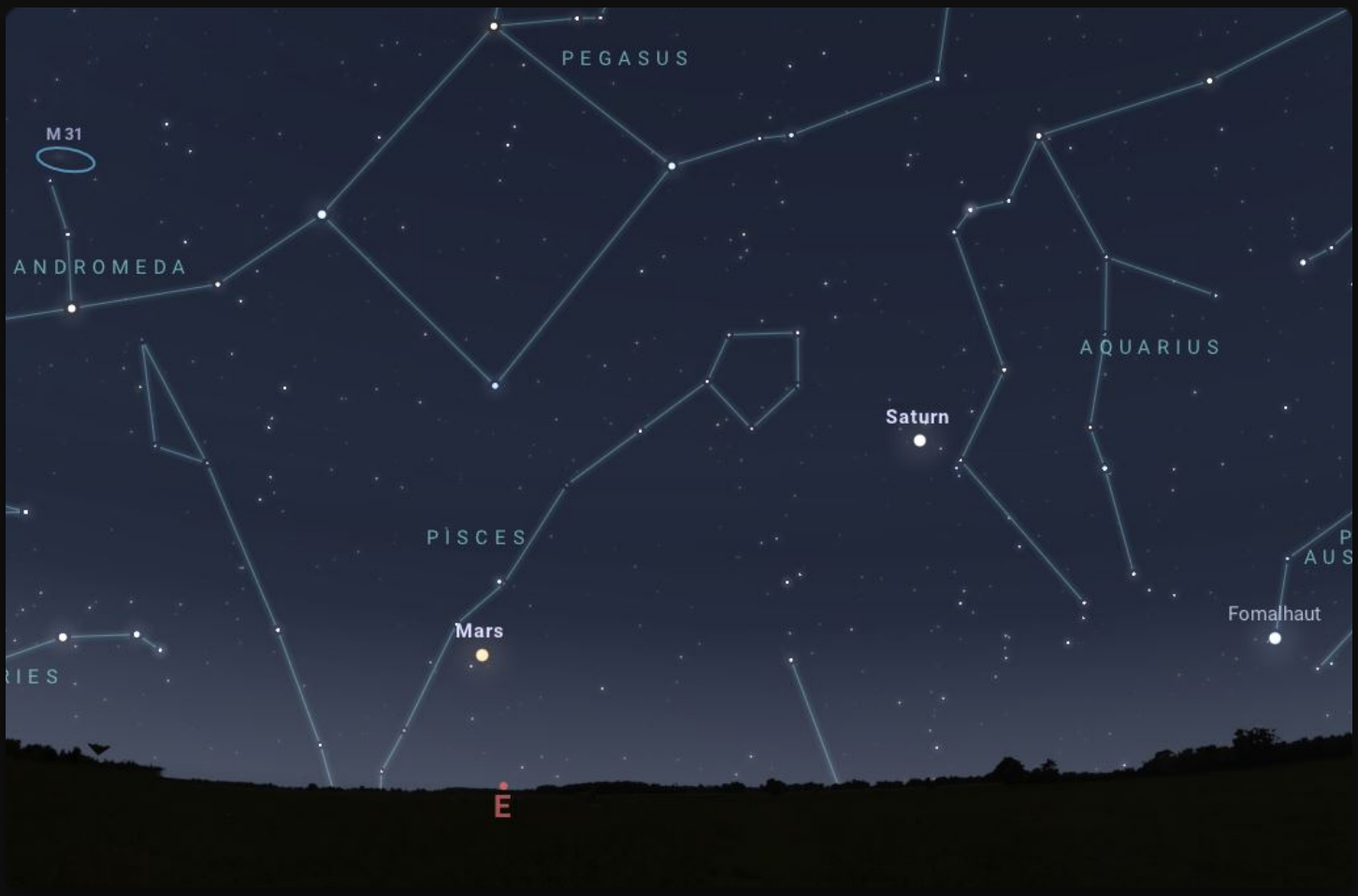


Antares size comparison. Image from Wikipedia public domain

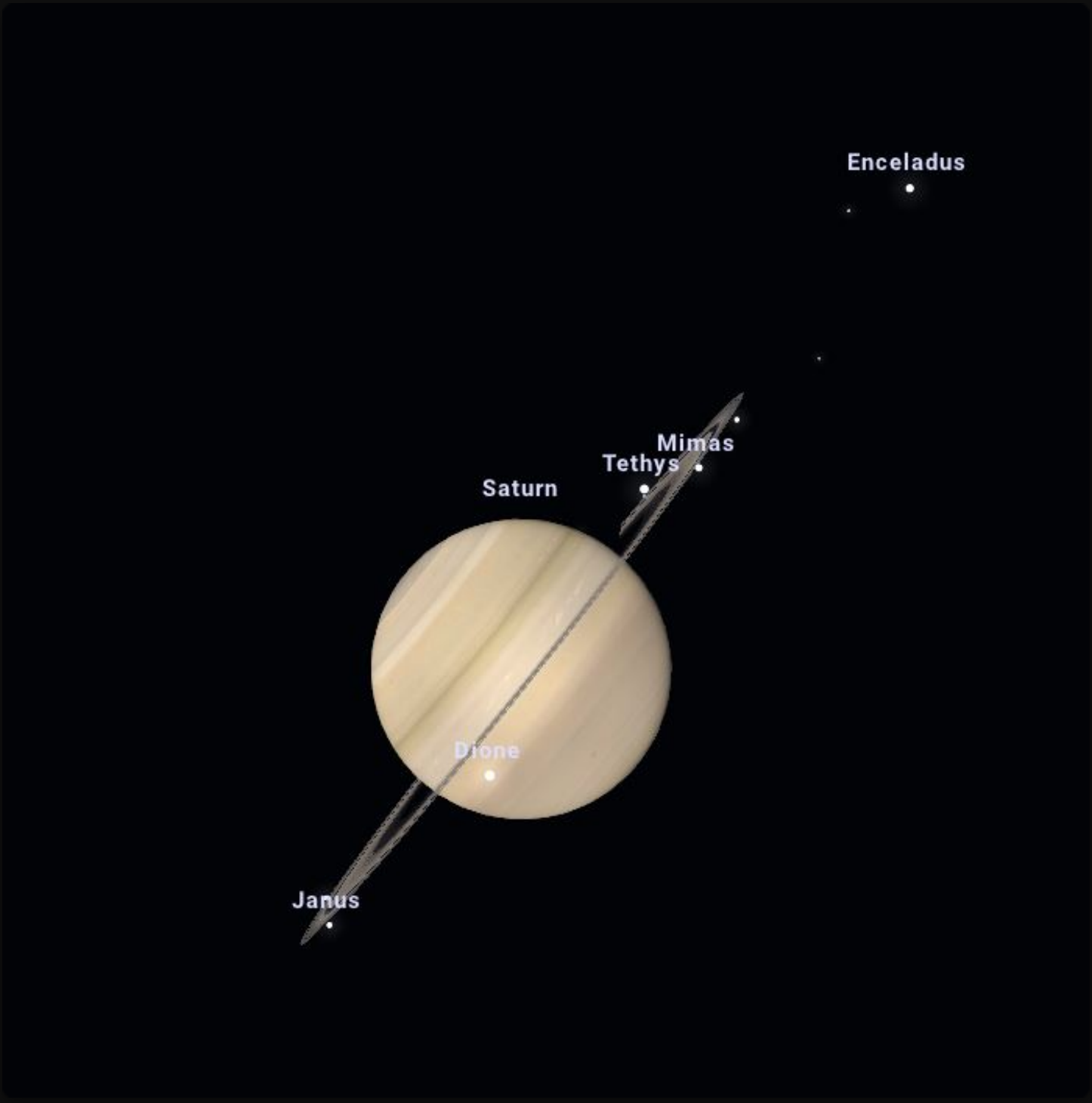
Planets

The only planet you will see in the evening in May this year is if you look straight down (Earth, haha). Jupiter, Venus, and Uranus are all very close to the Sun. Mercury rises before the Sun in the morning but is still likely lost in its glare. There is hope for some planet viewing though, if you are an early riser, you can find Saturn in the last half of May about an hour before Sunrise, 20 - 30 degrees above the southeast horizon. By late summer/early fall, Saturn will be more easily viewed in the evening sky. If you haven't viewed it telescopically since last fall/winter, you will notice the rings are getting very close to edge-on, a unique view of Saturn that we see about every 14-15 years. By March of 2025, the rings will virtually disappear from view as they become edge-on. This month Mars will be to the lower left of Saturn just 10 degrees above the eastern horizon. Over the rest of 2024, Mars will gradually brighten as it moves closer to Earth in its orbit. Mars is currently in a less favorable part of its orbital cycle, and the largest it will get in January of 2025 is 14.6 arcseconds. By the early 2030s, it will be much more favorable

as its elliptical orbit will bring it closer to Earth, and it will ultimately get as large as 24 arcseconds. If the ambitions of NASA and/or SpaceX proceed as planned, perhaps we will see humans going to Mars during that favorable time as well!



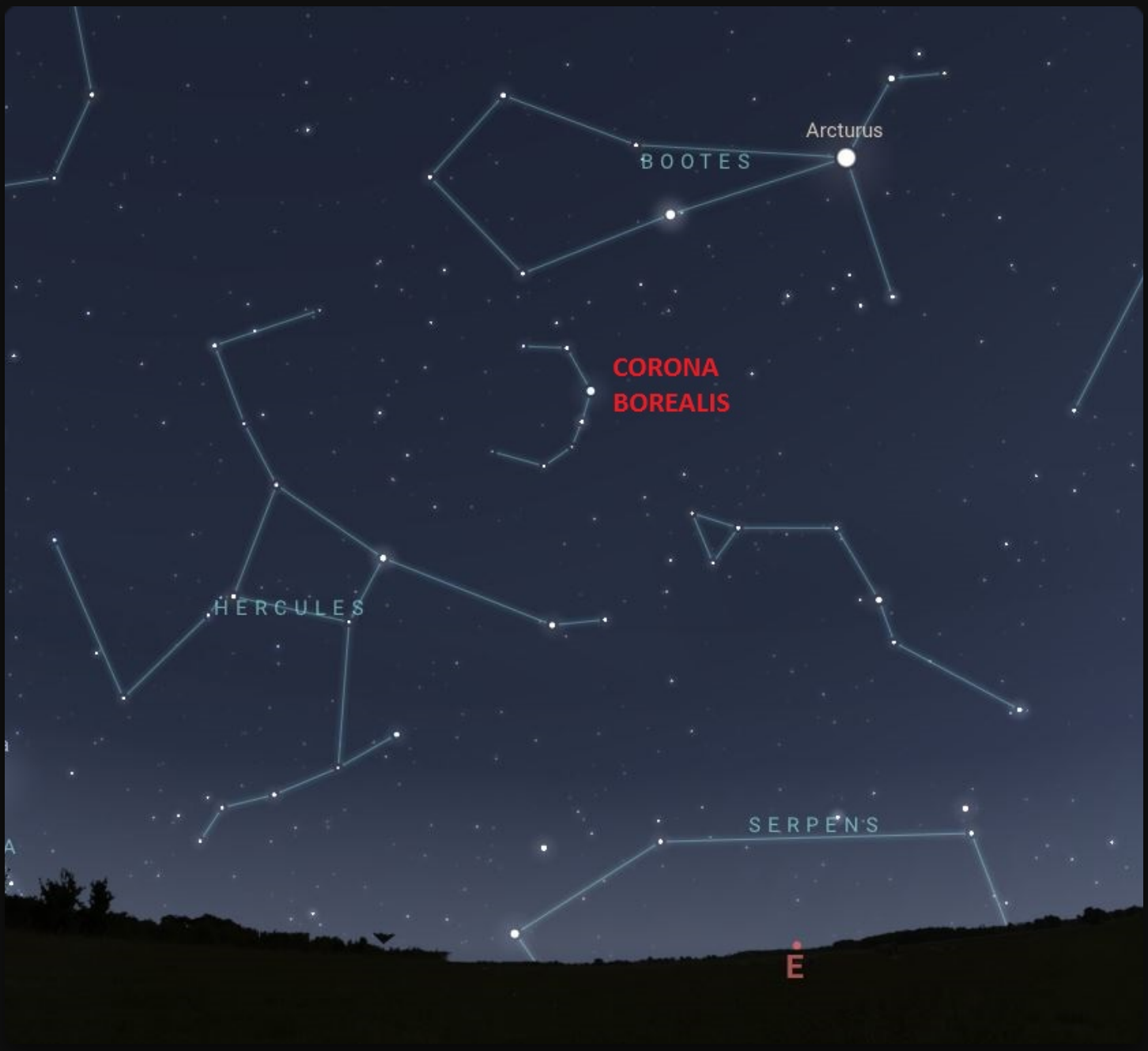
Saturn and Mars before sunrise in May. Image from Stellarium



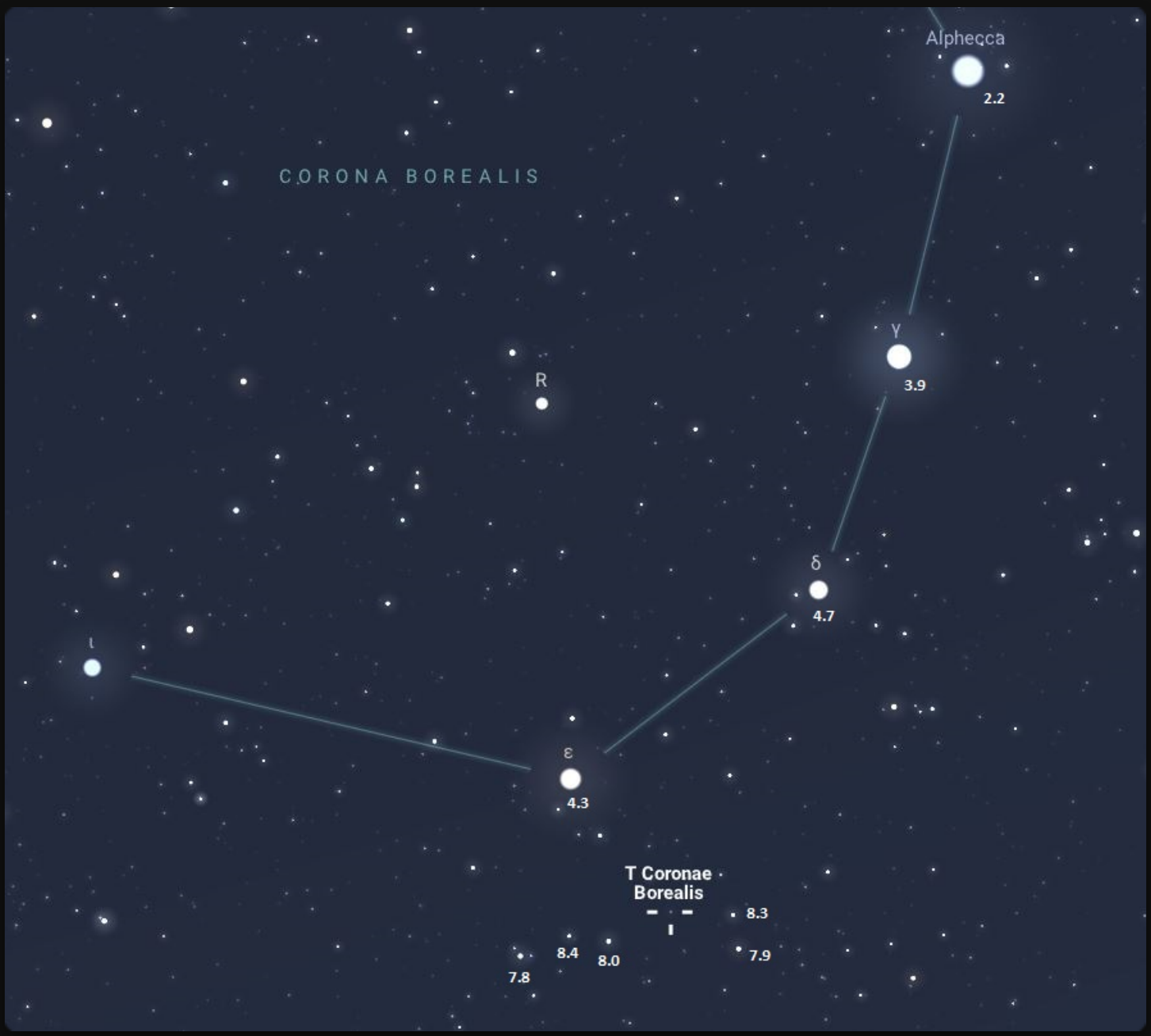
Saturn's rings nearly edge-on in May. Image from Stellarium

T Coronae Borealis

As I wrote in our March newsletter, the recurrent nova T Coronae Borealis is expected to erupt from its 10th magnitude level (visible only through a telescope) to 2nd magnitude (naked eye visibility) sometime between now and September. This event is gaining much more attention. Simply doing a Google search of the star's name will show you multiple media outlets are reporting about this upcoming "once-in-a-lifetime exploding star." By the first week of May at 10:00p and later, the constellation Corona Borealis is well up in the eastern sky between the bright star Arcturus in the constellation Boötes and The Keystone of Hercules. By becoming familiar with that area of the sky (via naked-eye, binoculars and telescopes) an observer should be able to easily keep an eye out for the appearance of a "new" star. Sharing this information with your friends and neighbors in advance of the event could make for a fun occasion when the nova finally makes its appearance. Much like the recent solar eclipse, this is a way to draw in the general public to the world of astronomy!



Corona Borealis location in early May at 10p. Image from Stellarium (this is the same image I used to show location in March at Midnight)



T CrB finder chart. Image from Stellarium

Greg writes: I recently got an iPhone 13 so I thought I would see what kind of pic I could get of the night sky. I aimed it in the vicinity of Corona Borealis (since I've been watching for the nova event) and was surprised at what a nice shot this was. It is a 3 second exposure, which is max for this phone (not using a 3rd party app). At the top of the photo I can see all 7 of the stars that make the backward "C", below and left of that is the keystone of Hercules. There was bright moonlight, so the woods behind our house were nicely lit up as well. I think the photo actually looks like a painting.

Astronomy is such a wide-ranging and versatile pursuit that can be enjoyed in so many ways. From spending solitary hours in the dark hunting obscure faint objects, to being in a Walmart parking lot with hundreds of people cheering for a total solar eclipse, there are myriad ways to enjoy the universe around us.

The Queen Speaks

Robin Byrne

Happy Birthday The First Test of General Relativity

This month we celebrate the confirmation of an interesting idea. In 1916, Albert Einstein published his theory of special relativity. This theory has a number of bizarre effects associated with it, including the idea that mass warps space and time. One result of warped space is that an object that thinks it is moving in a straight line, will actually be following a curved path. This is true even for light.

In 1919, an opportunity arose to test this crazy idea. Arthur Eddington realized that our Sun should be massive enough to cause a noticeable shift in the path of starlight passing near it. However, since the Sun is so bright, it would be impossible to see any other light source near the Sun's disk. However, during a solar eclipse, with the Sun's disk blocked, light from stars appearing in the same direction as the Sun would be visible. The solar eclipse on May 29, 1919 gave Eddington the

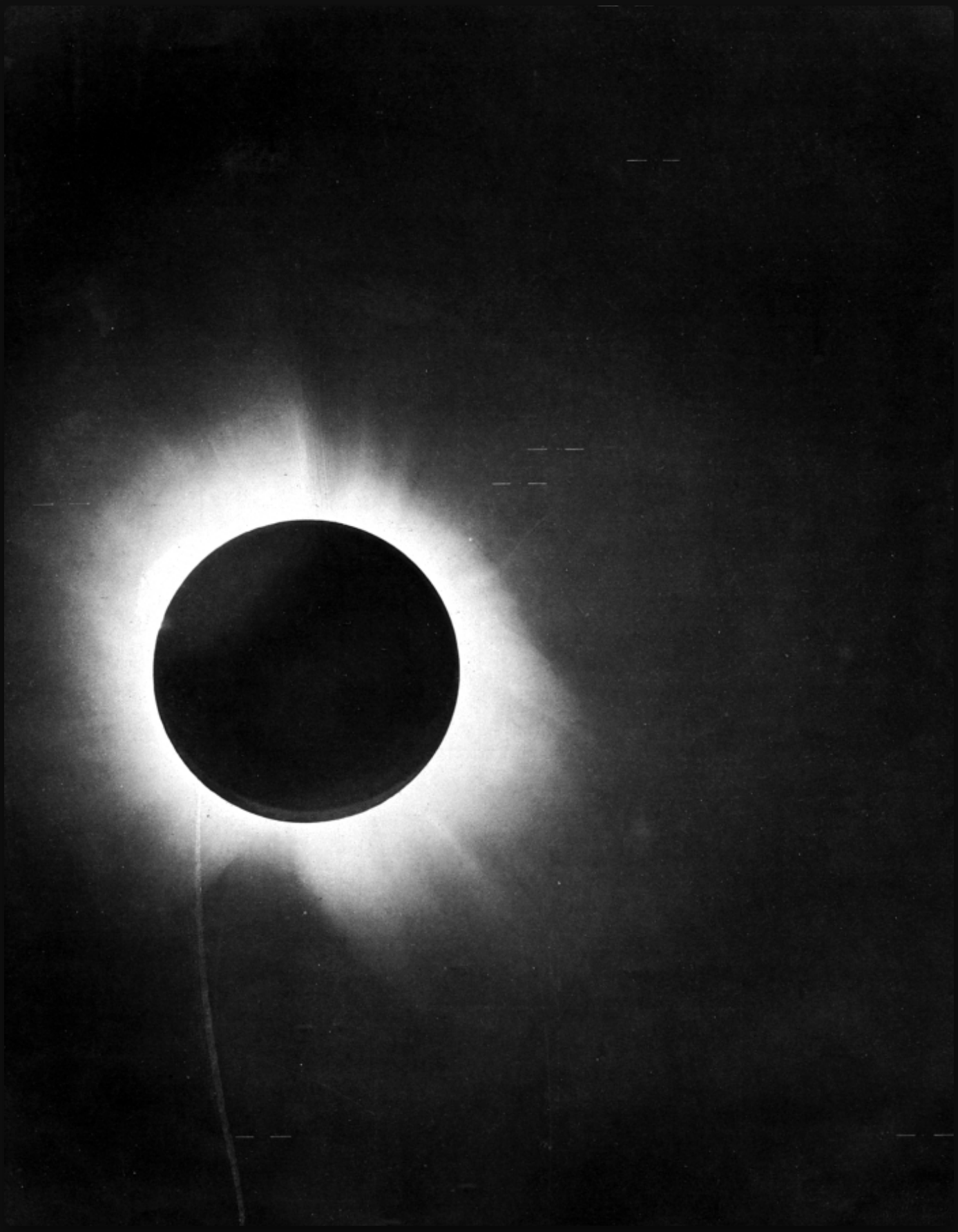
opportunity to perform an historical experiment, with the Sun passing in front of the Hyades star cluster.

English astrophysicist Sir Arthur Stanley Eddington (1882–1944)

Albert Einstein during a lecture in Vienna in 1921

Eddington photographed the Sun during the eclipse with long enough exposures to reveal the background stars (2 to 20 seconds). By comparing this image to ones taken of the same region of the sky without the Sun in front, he could look to see if the apparent position of the stars had changed. The general theory of relativity predicted that the Sun's mass would warp the space near the Sun enough to bend the light from these stars to a new position in the sky. This would give the impression that some of the stars had moved when comparing the two images.

The predicted shift for stars appearing almost in line with the Sun was only about 2 seconds of arc. The farther the star is from being directly in line with the Sun, the smaller the shift becomes. In November of 1919, Eddington announced that the eclipse observations confirmed the predictions with star images shifting by a very small amount.



The total solar eclipse of May 29, 1919. Lines mark the brighter stars of the Hyades star cluster to be astrometrically measured.

Some modern critics believe that Eddington may have fudged his data by a small amount to give the results he expected. The small amount of shift observed would have been well within his range of error. However, subsequent observations have confirmed general relativity to be correct.

Whether Eddington published what he wanted to get or what he actually observed, his announcement of confirming general relativity was one of the main reasons why it became accepted by the scientific community. Up to this point, most people were very skeptical of the general theory (although the special theory of relativity was accepted). This one announcement made all the difference in people's perception of the theory and of Einstein. So, whether the experiment really worked or not, the eclipse of 1919 will always be remembered as the first experiment that brought the theory of general relativity into the world of accepted ideas.

With all the images of the April 8 eclipse, did anyone capture some stars near the Sun? It would be interesting to see if yet

another test of relativity could be done with the myriads of amateur astro photographs that were taken. Who's up for some citizen science?

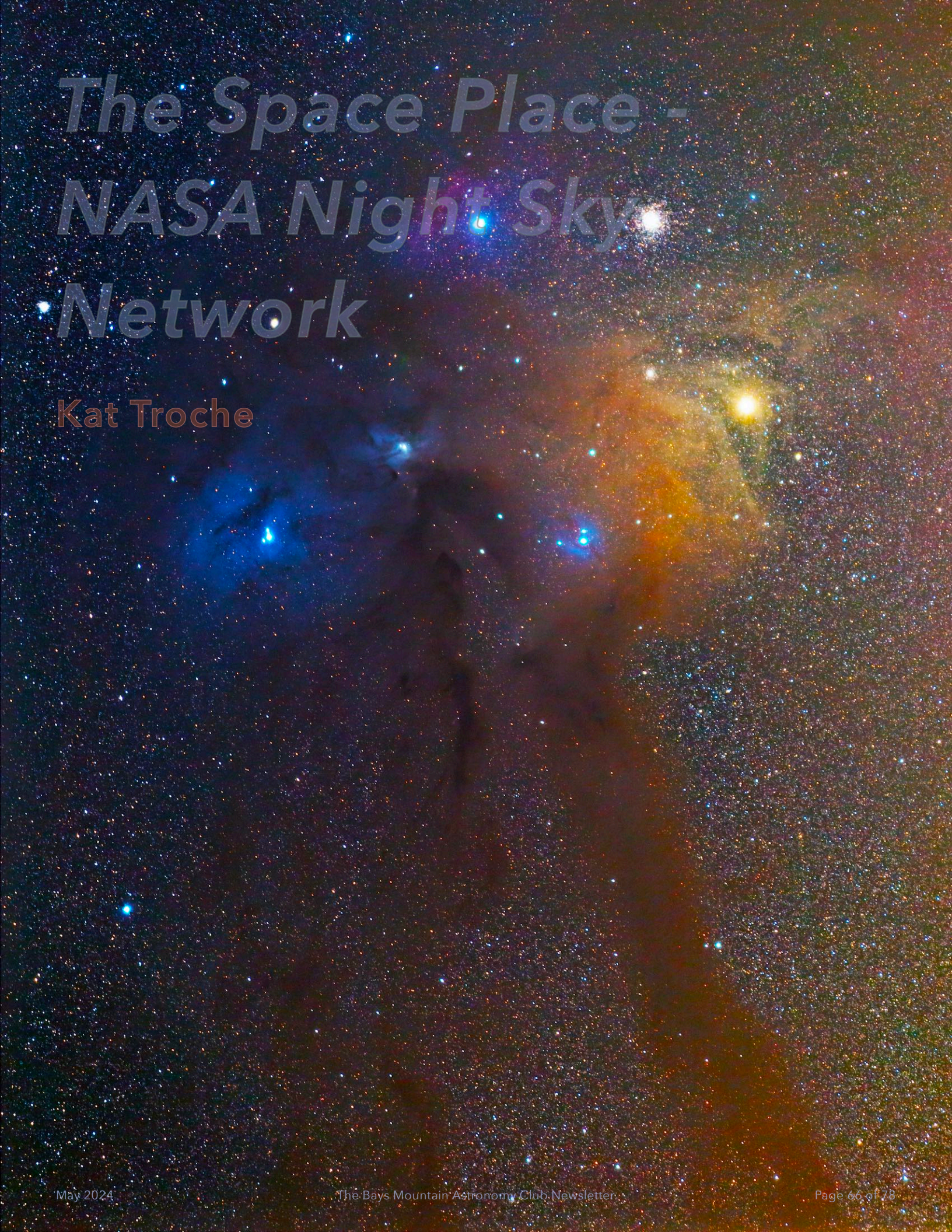
References:

Relativity and the 1919 Eclipse - ESA

Theory of Relativity - Wikipedia

The Space Place - NASA Night Sky Network

Kat Troche

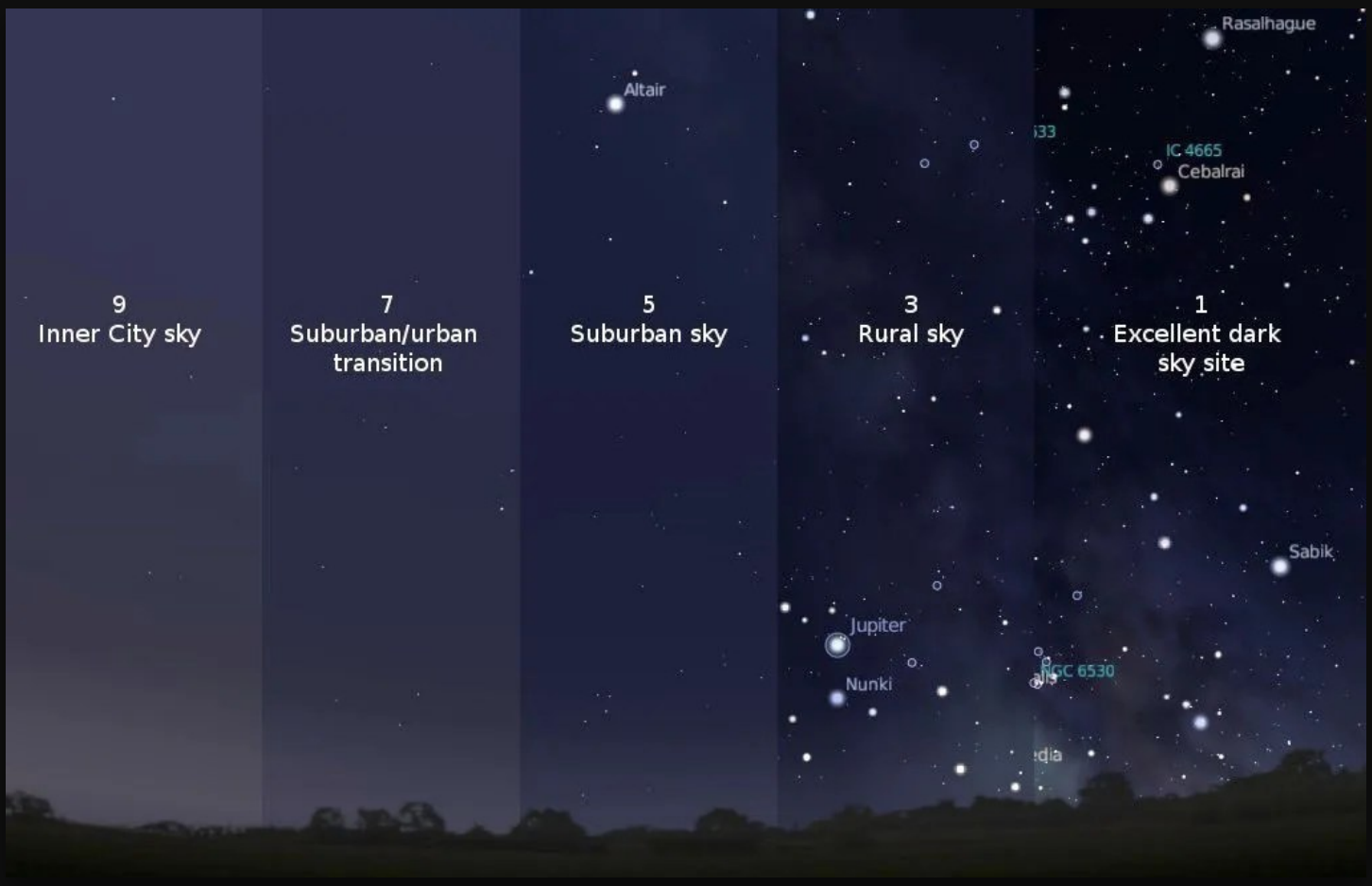


May's Night Sky Notes: Stargazing for Beginners

Millions were able to experience the solar eclipse on April 8, 2024, inspiring folks to become amateur astronomers – hooray! Now that you've been 'bitten by the bug,' and you've decided to join your local astronomy club, here are some stargazing tips!

The Bortle Scale

Before you can stargaze, you'll want to find a site with dark skies. It's helpful learn what your Bortle scale is. But what is the Bortle scale? The Bortle scale is a numeric scale from 1-9, with 1 being darkest and 9 being extremely light polluted; that rates your night sky's darkness. For example, New York City would be a Bortle 9, whereas Cherry Springs State Park in Pennsylvania is a Bortle 2.

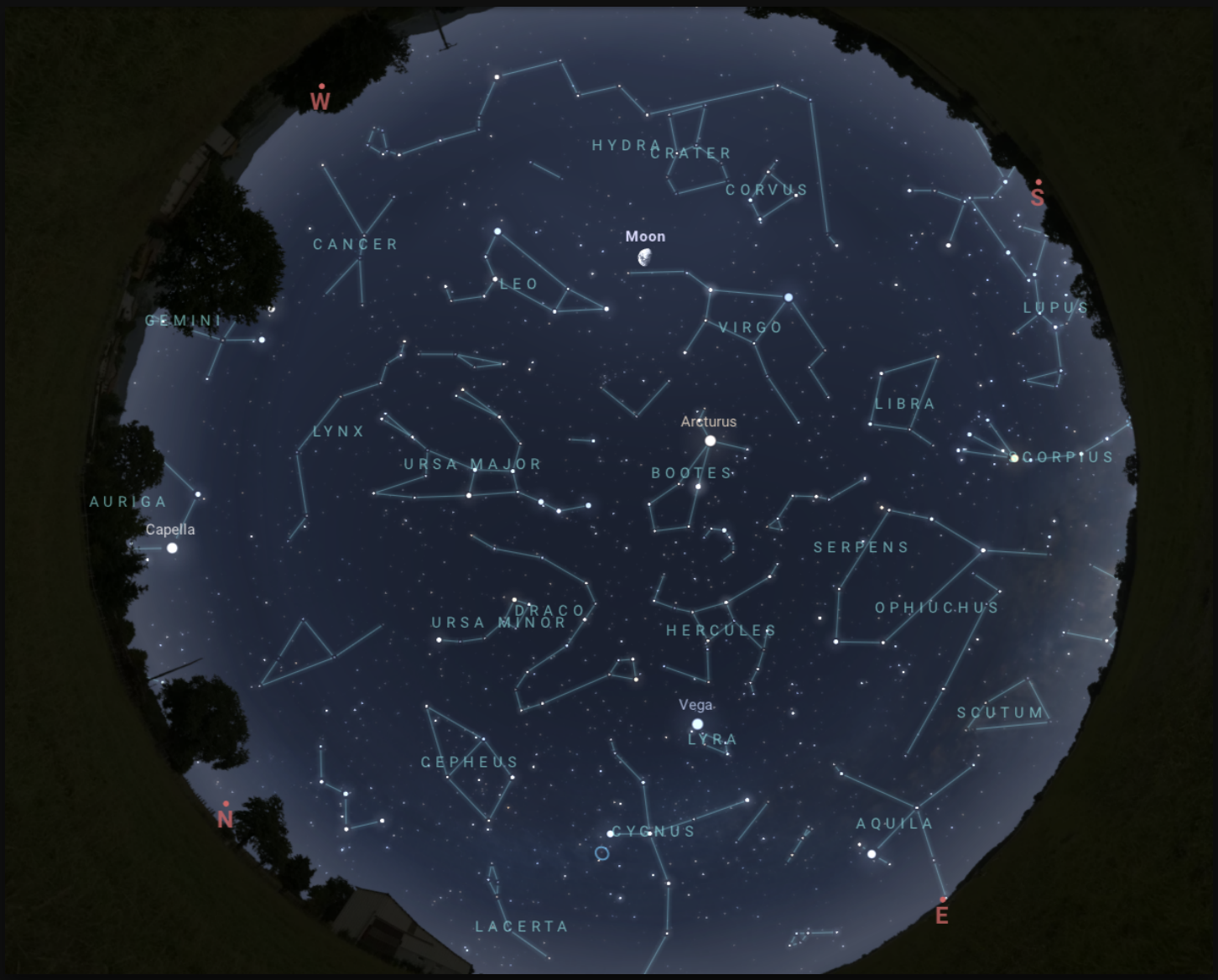


The Bortle scale helps amateur astronomers and stargazers to know how much light pollution is in the sky where they observe. Credit: International Dark Sky Association

Determining the Bortle scale of your night sky will help narrow down what you can expect to see after sunset. Of course, other factors such as weather (clouds namely) will impact seeing conditions, so plan ahead. Find Bortle ratings near you here: www.lightpollutionmap.info

No Equipment? No Problem!

There's plenty to see with your eyes alone. Get familiar with the night sky by studying star maps in books or with a planisphere. These are great to begin identifying the overall shapes of constellations, and what is visible during various months.



A full view of the northern hemisphere night sky in mid-May. Credit: Stellarium Web

Interactive sky maps, such as Stellarium Web, work well with mobile and desktop browsers, and are also great for learning the constellations in your hemisphere. There are also several astronomy apps on the market today that work with the GPS of your smartphone to give an accurate map of the night sky.

Keep track of Moon phases. Both the interactive sky maps and apps will also let you know when planets and our Moon are out! This is especially important because if you are trying to look for bright deep sky objects, like the Andromeda Galaxy or the Perseus Double Cluster, you want to avoid the Moon as much as possible. Moonlight in a dark sky area will be as bright as a streetlight, so plan accordingly! And if the Moon is out, check out this Skywatcher's Guide to the Moon: bit.ly/MoonHandout

Put On That Red Light

If you're looking at your phone, you won't be able to see as much. Our eyes take approximately 30 minutes to get dark sky adapted, and a bright light can ruin our night vision temporarily. The easiest way to stay dark sky adapted is to

avoid any bright lights from car headlights or your smartphone. To avoid this, simply use red lights, such as a red flashlight or headlamp. The reason: white light constricts the pupils of your eyes, making it hard to see in the dark, whereas red light allows your pupils to stay dilated for longer. Most smartphones come with adaptability shortcuts that allow you to make your screen red, but if you don't have that feature, use red cellophane on your screen and flashlight.

Up next: why binoculars can sometimes be the best starter telescope, with Night Sky Network's upcoming mid-month article through NASA's website!

This article is distributed by NASA Night Sky Network

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit **nightsky** to find local clubs, events, and more!

BMAC Calendar & More

Calendar:

BMAC Meetings:

- Friday, May 3, 2024 - 7p - Students from the region will give short presentations on scientific research and projects.
- Friday, June 7, 2024 - 7p - Eclipse stories from BMACers.
- Friday, August 2, 2024 - 7p - Topic TBA.
- Friday, September 6, 2024 - 7p - Topic TBA.
- Friday, October 3, 2024 - 7p - Topic TBA.
- Friday, December 6, 2024 - 7p - Topic TBA.
- Friday, February 7, 2025 - 7p - Topic TBA.
- Friday, March 7, 2025 - 7p - Topic TBA.
- Friday, April 4, 2025 - 7p - Topic TBA.
- Friday, May 2, 2025 - 7p - Topic TBA.

SunWatch:

- Every clear Saturday & Sunday - 3p-3:30p - March-October - By the Dam
  - View the Sun safely with a white-light view if clear.; Free.
  - You must have completed the Park Volunteer Program in order to help with the public program. If you have, and have been trained, please show up at least 30 minutes prior to the official start time.

StarWatch:

- April 27, 2024 - 8:30p
- October 5 & 12, 2024 - 7:30p
- October 19, 26 & November 2 - 7p
- November 9, 16, 23 & 30 - 6p
  - View the night sky with large telescopes at the observatories. If poor weather, an alternate live tour of the night sky will be held in the planetarium theater. Free.
  - You must have completed the Park Volunteer Program in order to help with the public program. If you have, and have been trained, please show up at least 30 minutes prior to the official start time.

pecial Events:

- **Astronomy Day - May 18, 2024 - 1p-4p; 8:30p-9:30p**
  - Come help share the fun of astronomy with the public. There will be tables with different themed topics plus solar and night viewing.
- **Annual Club Picnic - July 2024**
  - Date and site location will be sent directly to full BMAC members. BMACers and their families are welcome to enjoy an evening of astronomy-themed games and activities along with a potluck dinner and observing.
- **StarFest 2024 - November 1-3, 2024**
  - Our 39th annual astronomy convention / star gathering for the Southeast United States. Three days of astronomy fun, 5 meals, 4 keynote speakers, unique T-shirt and more!
  - **Pre-registration by Oct. 2024 with full payment is mandatory for attendance. Sorry, no walk-ins nor "visits."**
  - **Link for all the StarFest info including registration and hotel reservation links.**
- **BMAC Dinner - January 2025**
  - This event is for members and their families. Look for an e-mail in January with all the information.

Regular Contributors:

Greg Penner

Robin Byrne

Adam Thanz

Greg Penner is a semi-retired architect living in the Tri-Cities area since 2018. He has enjoyed astronomy since childhood when he received a “department store telescope” and viewed Saturn for the first time. He has been a member since 2018.

Robin Byrne has been writing the science history column since 1992 and was chair in 1997. She is an Associate Professor of Astronomy & Physics at Northeast State Community College (NSCC).

Adam Thanz has been the BMAC Newsletter Editor for all but a small number of issues since 1992. He is the Planetarium Director at Bays Mountain Park and an astronomy adjunct instructor at NSCC since 2000.

Connection:

Bays Mountain Astronomy Club:

- 853 Bays Mountain Park Road; Kingsport, TN 37650
- (423) 229-9447 - **Park Site** - **Club Site**
- Newsletter edited by **Adam Thanz**

Dues:

- Dues are highly supplemented by the Bays Mountain Park Association and volunteerism by the club. As such, our dues are kept at an extremely low cost.
- $16 / person / year
- $6 / each additional family member
- Note: if you are a Park Member (which incurs a separate, additional fee), then a 50% reduction in BMAC dues are applied.
- Dues can be paid in many ways. The easiest way is to pay via the CivicRec online portal. If you are a current member, please log in with your e-mail address and reset your password if you have not already done so. You can then update your membership. Here's the direct **link**. If you want to add family members, then add them via the internal link. You can also pay at the gift shop, by mail or over the phone.

Chapter Background Image Credits:

- **Cover image of Southern Milky Way by Adam Thanz.**
  - *Sony A7ii with Zeiss Batis 2.8/18 lens, f/2.8, 8 sec., ISO 6,400, August 9, 2020.*
- **Table of Contents image of Comet NEOWISE (C/2020 F3) by Adam Thanz**
  - *Sony A7ii with Sony FE 2.8/90 Macro G OSS lens, f/2.8, 8 sec., ISO 4,000, July 15, 2020.*
- **Cosmic Reflections image of the Summer Triangle area of the Milky Way by William Troxel.**
  - *Image captured July 23, 2016.*
- **BMAC Notes painting of the Moon with moon glow by Christa Cartwright.**
  - *Painting based on a photograph of the Moon Christa captured July 2020.*
- **Stellar Observations image of Crescent Nebula by David Reagan.**
  - *This image was taken with a 140mm refractor in his suburban backyard using an AstroPhysics 900 mount, 8.7 hours of 5 minute Ha and OIII subexposures, combined in AstroPixelProcessor as an HOO image and processed in Lightroom and Photoshop. Image captured in 2022.*
- **The Queen Speaks image of a solar halo by Robin Byrne.**
  - *iPhone 7, June 8, 2020.*
- **The Space Place - NASA Night Sky Network image of the Rho Ophiuchi cloud complex by Brandon Stroupe.**
  - *Canon 6D with Canon 2.8/70-200mm lens, f/2.8 @200mm, 20 x 120 sec. exposures, ISO 1,000, stacked in Deepsky Stacker, processed in Adobe Photoshop CC, Skywatcher Star Adventure mount, September 19, 2015.*
- **BMAC Calendar & More image of the Moon by Greg Penner.**
  - *iPhone shooting through a 9mm eyepiece and 12.5" Truss Tube Dobsonian @212x.*
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